Wisconsin Retirement System

Actuarial Education and December 30, 2010 Annual Actuarial Valuation Results

June 2011

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Retirement Plans

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Types of Retirement Plans

- Defined Benefit (DB) Plans
- Defined Contribution (DC) Plans
- Hybrid Plans

Pure Defined Benefit Plans

- Benefit determined by a formula
- Usually involves Years of Credited Service
- Final Average Salary (FAS)
- A multiplier such as 2%
- 2.0% x 30 years x $50,000 = $30,000 per year

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Pure Defined Contribution Plans

- A stated percent of earnings is put into an account each year (Example: 6% of pay per year)
- Employee can usually direct the investment of that account
- Balance in the account is available for distribution at retirement (or earlier)

Defined Benefit Plans

Risk Characteristics

- Investment Risk
- Mortality Risk
- Inflation Risk

- Employer bears the risks
- Benefits are predictable (defined)

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Defined Contribution Plans

Risk Characteristics

- Investment Risk
- Mortality Risk
- Inflation Risk

- Employee bears the risks
- Benefits are not predictable

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Hybrid Plans

Risk Characteristics

- Investment Risk
- Mortality Risk
- Inflation Risk

- Employee and Employer share risk
- Some Benefits are predictable

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Wisconsin Retirement System

WRS is a Hybrid Plan

DB Aspect:	Formula benefit equal to 1.6% x FAE x service (general)
DC Aspect:	Minimum benefit equal to annuitized value of 2 x accumulated contributions
Risk Sharing Aspects:	Employee contributions Employer contributions Benefit adjustment contributions Dividends depend on overall investment performance

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Actuarial Mathematics

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Basic Retirement Funding Equation

$$C + I = B + E$$

Where

- C is Contribution Income
- I is Investment Return
- B is Benefits Paid
- E is Expenses

"Money In = Money Out"

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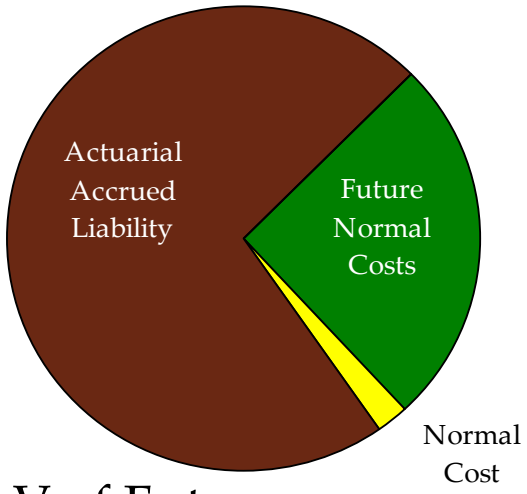
Components of the Actuarial Valuation

- **Present Value of Future Benefits (PVFB) -** Present Value of all future benefits payable to current participants (active, retired, terminated vested).

- **Accrued Actuarial Liability -** Portion of PV of Future Benefits allocated to prior years.

- **Normal Cost -** Portion of PV of Future Benefits allocated to current year.

- **Present Value of Future Normal Costs (PVFNC)-**V of Future Present Value of Benefits allocated to future years.



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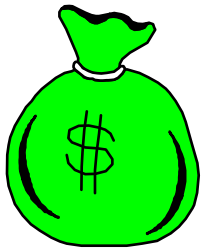
Funding a $10,000 Annual Pension for a Person

Present Value of Benefits

At Retirement Date $90,000



At Valuation Date $25,000

Allocated to Past and Future Service

$17,000
Actuarial Accrued Liability

$8,000
Present Value of
Future Normal Costs

Actuarial Accrued Liabilities
\- Accrued Assets
Unfunded Actuarial Accrued Liabilities

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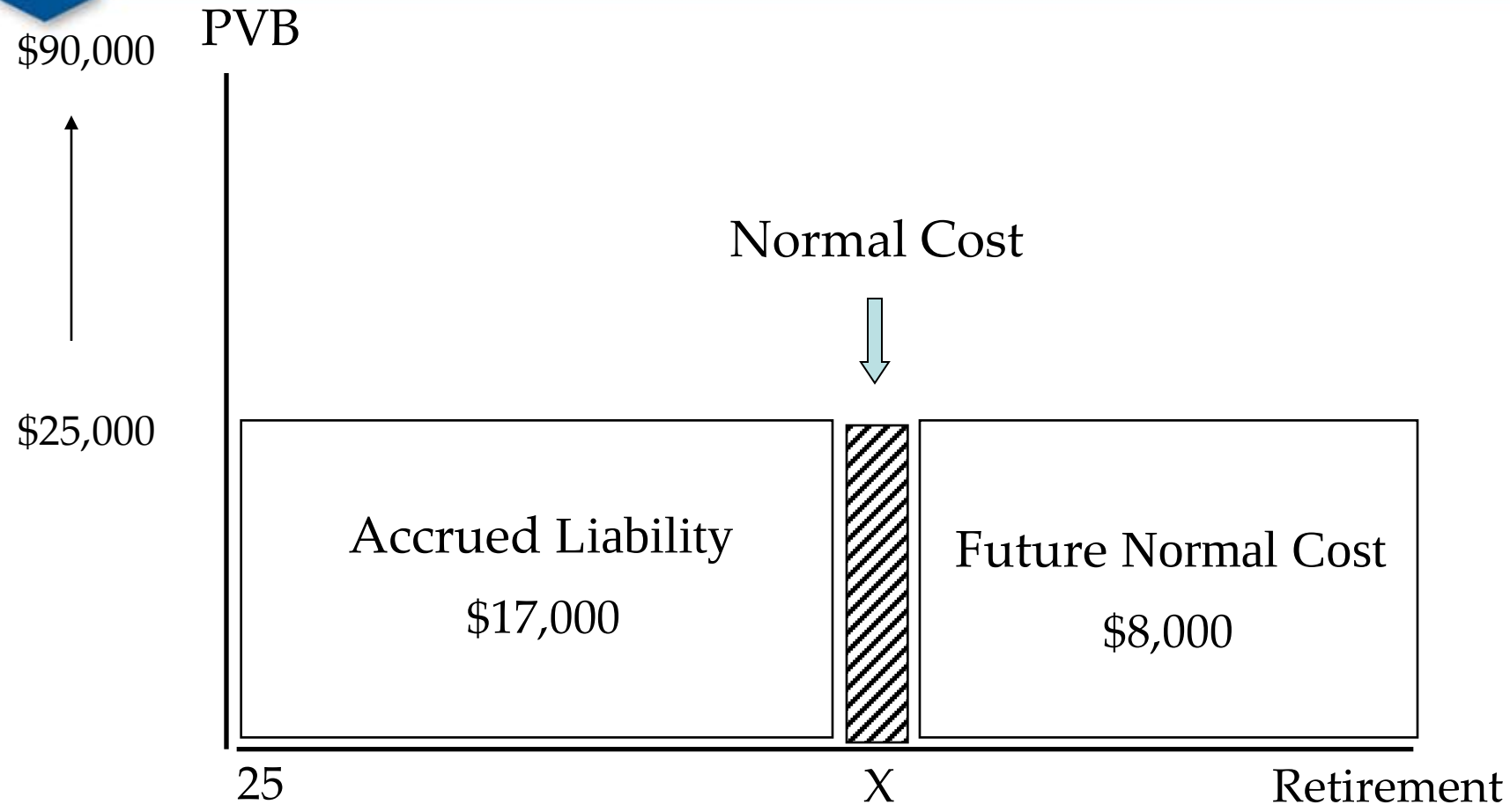
Completing the Pension Funding



As the person ages, the boxes grow Northward until the PVB becomes $90,000. At the same time, the normal cost layer moves to the right. At retirement, there is one big square box; the accrued liability and the PVB are both $90,000, and the Future Normal Cost is $0.

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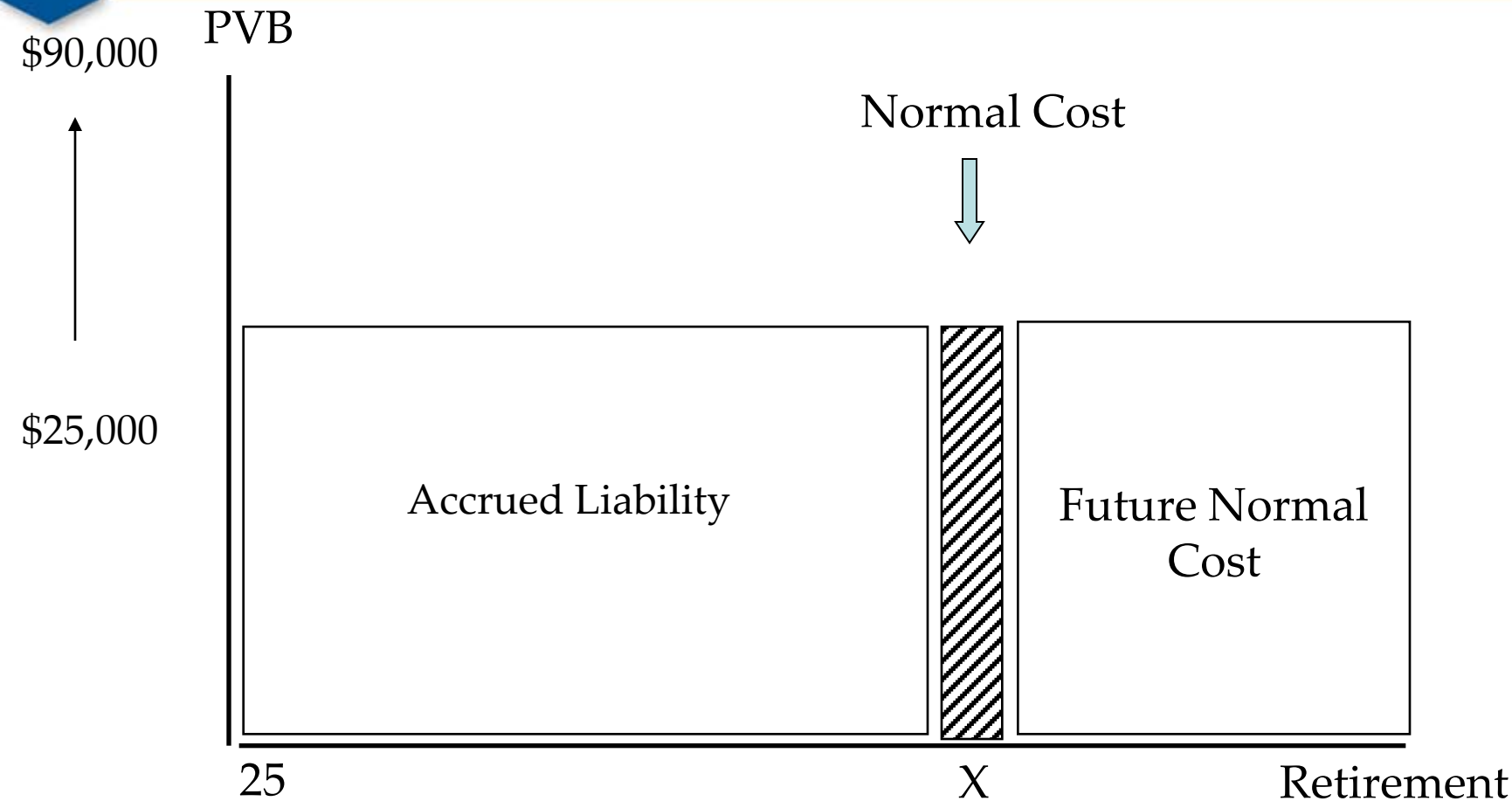
Completing the Pension Funding



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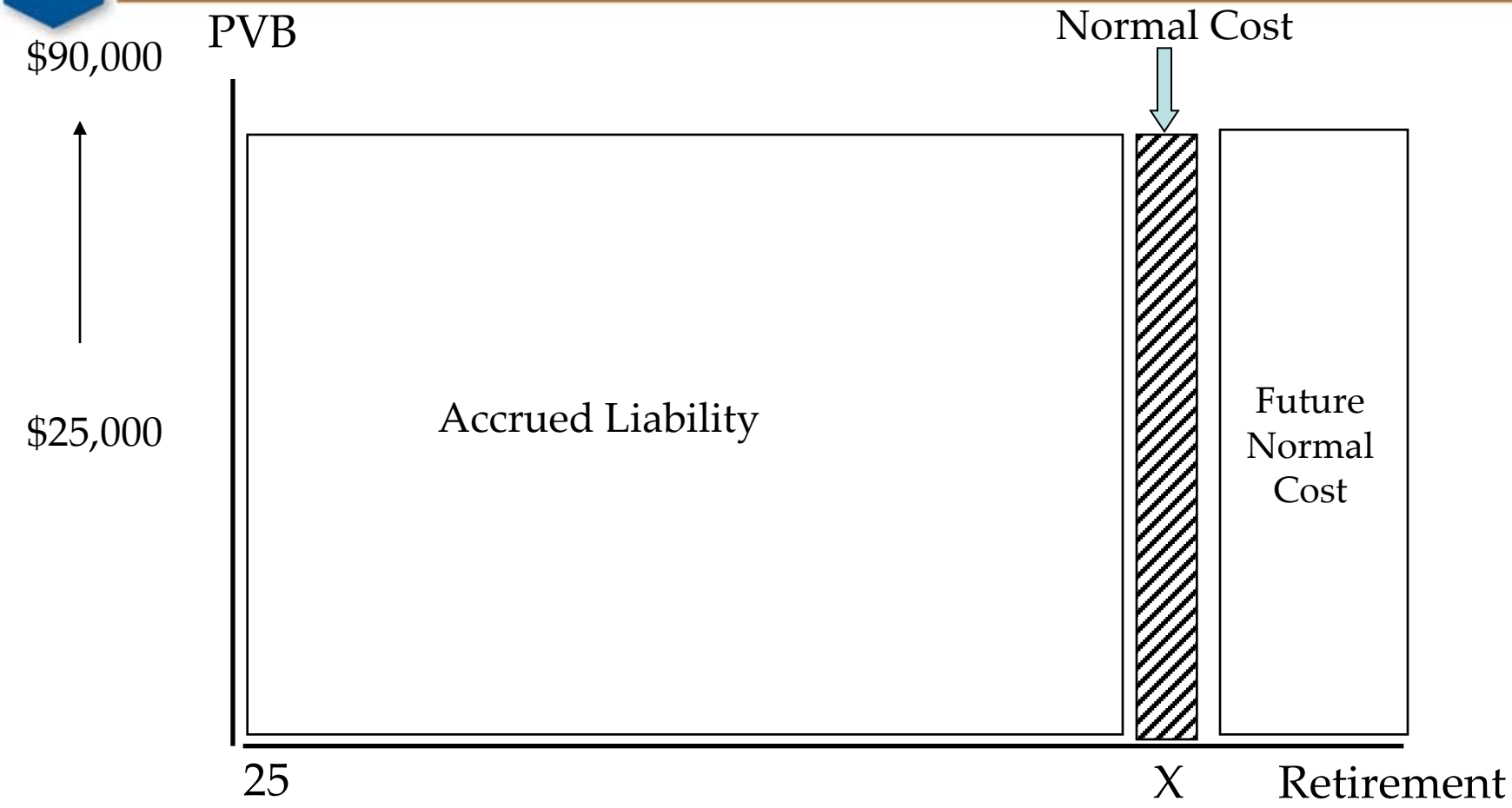

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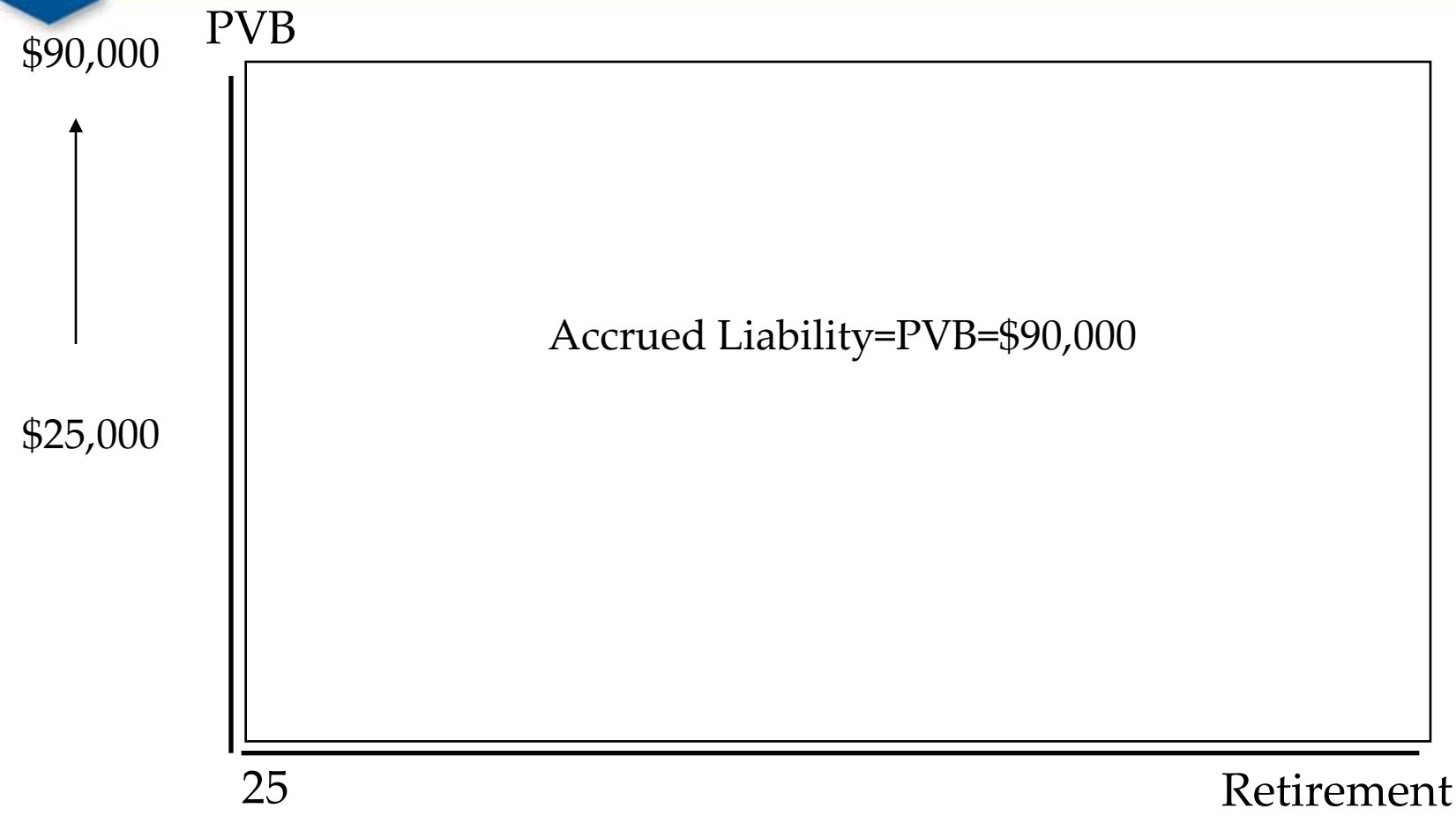

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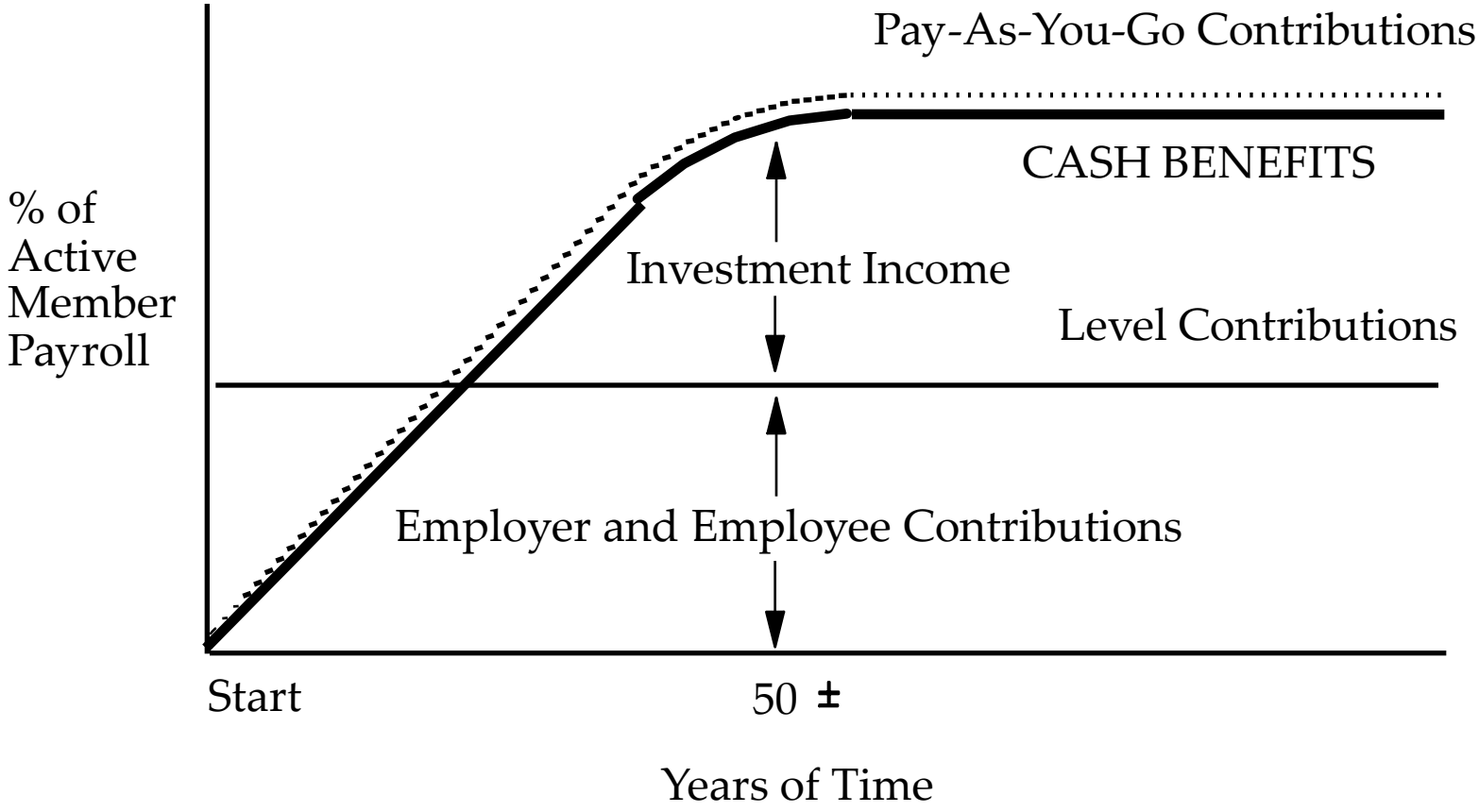
The Long Term Solution to the Equation



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Cost Methods

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Cost Methods

The Actuarial Cost Method determines the allocation of cost between past and future

Types of Cost Methods are:

- Entry Age Normal Cost
- (Projected) Unit Credit Normal Cost
- Aggregate Cost Method
- Frozen Initial Liability Method

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Cost Methods

Typical Cost Method Example (amounts in millions):

Normal Cost	=	PVFNC	=	$15,300	= 12.6% of pay
		PVFS		$121,000	
Actuarial Accrued Liability	=	PVFB	-	PVFNC	
	=	$54,000	-	$15,300	
	=	$38,700			
Unfunded Liability	=	AAL	-	Assets	
	=	$38,700	-	$39,300	
	=	$(600)			

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Cost Methods

Typical Cost Method Example:

Amortization of Unfunded	=	UAL	÷	Amort Factor	÷	Payroll
Liability	=	$(600)	÷	13.8	÷	$12,600
	=	(0.4)% of payroll				

Contribution	=	Normal Cost	+	Amortization of Unfunded Liabilities		
	=	12.6%	+	(0.4)%	=	12.2%

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Cost Method - WRS

WRS uses the Frozen Initial Liability Method

- "Frozen Initial Liability Method" in which normal cost is pooled, but each employer is separately responsible for its own unfunded liability
- Actuarial Gains and Losses affect the pooled normal cost, not the unfunded liability as in most plans
- Pooled Normal Cost contains a component related to accumulated unamortized past Gains and Losses
- That component is called the Experience Amortization Reserve or "EAR"

Cost Method - WRS

WRS Example:

$$\text{Normal Cost} = \frac{\text{PVFNC}}{\text{PVFS}} = \frac{\$15{,}300}{\$121{,}000} = 12.6\% \text{ of pay}$$

PVFNC – Present Value of Future Normal Costs
PVFS – Present Value of Future Salary

Actuarial Accrued Liability was calculated at initial valuation and "frozen"

Unfunded liability was calculated at initial valuation and amortized over a period of years – most of this has now been paid off

Cost Method - WRS

Experience Amortization Account (EAR):

EAR	=	PVFB	-	PVFNC	- Assets	-	UAAL
	=	$54,000	-	15300	- $39,300	-	$100
	=	$(700)					
EAR Amortization	=	EAR	÷	Amortization Factor		÷	Payroll
	=	$(700)	÷	13.8		÷	$12,600
	=	(0.4)% of payroll					
Contribution	=	Normal Cost	+	EAR Amortization		+	Unfunded Liability Amortization
	=	12.6%	+	(0.4)%		+	0.1%
	=	12.3%					

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Cost Methods - WRS

Why was the EAR account established?

- EAR helps stabilize contribution rates
- EAR amortization period can be varied to minimize short-term rate fluctuations
- Period used must be between 10 and 30 years
- Standard period is 20 years

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Measurement of Assets

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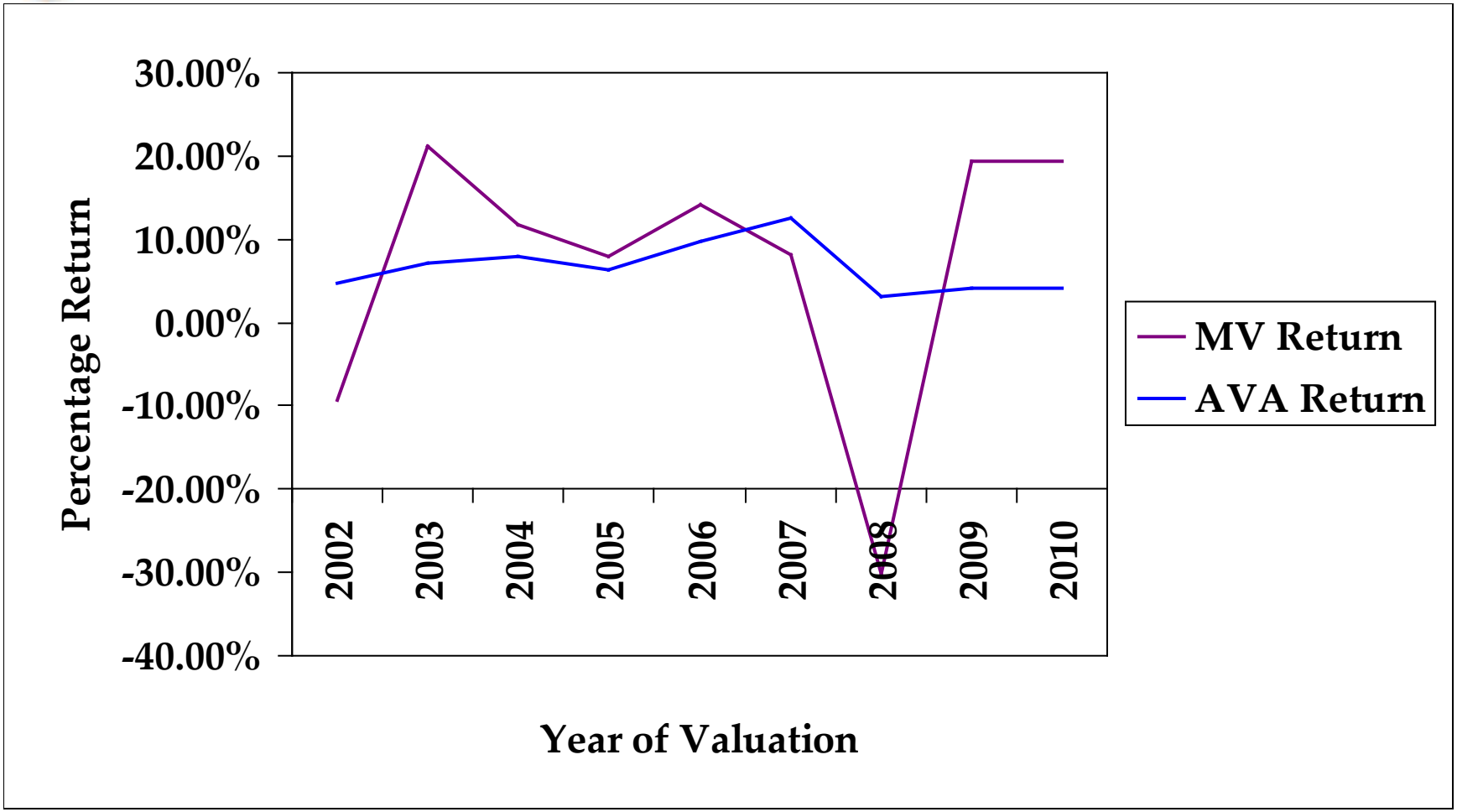
Measurement of Assets at WRS

- In the WRS actuarial work, asset gains and losses above or below the assumed rate of return are smoothed in over the current year, and four future years
- Four years after a valuation date, all asset gains or losses known at that time are fully recognized
- Smoothing method in WRS is referred to as the Market Recognition Account (MRA)

WRS Core Investment Trust: Market Recognition Account ($ Millions)

		2010	2011	2012	2013	2014
1.	Beginning Funding Value	$ 76,953				
2.	Beginning Market Value	67,482				
3.	Ending Market Value	73,177				
4.	Net Cash Flow	(2,219)				
5.	Total Investment Return	7,913				
6.	Amount for Immediate Recognition	5,916	-			
7.	Amount for Phase-In: (5 - 6)	1,997	-			
8.	MRA Recognition	(2,406)	(3,471)	(3,683)	1,687	399
9.	Total Recognized Return: (6 + 8)	3,510				
10.	Ending Funding Value: (1 + 4 + 9)	78,244				
11.	Difference between MV and FV: (3 - 10)	(5,067)	(1,596)	2,087	399	-
12.	Recognized Rate of Return	4.6%				
13.	Market Rate of Return	11.9%				
14.	Ratio of Funding Value to Market Value	107%				

Market Value Return vs. Actuarial Value Return



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Summary of Results

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Summary of Results
Active Participants

Valuation Group	Number	Group Averages		
		Age	Service	Money Purchase Balance
General	136,948	46.6	2.9	$12,765
Executive Group & Elected Officials	599	54.0	4.5	29,789
Protective Occupation with Social Security	4,332	40.8	3.7	15,320
Protective Occupation without Social Security	197	42.9	6.7	39,108
Total Inactive Participants	**142,076**	**46.4**	**2.9**	**$12,952**
Prior Year	140,721	46.1	3.0	$13,080

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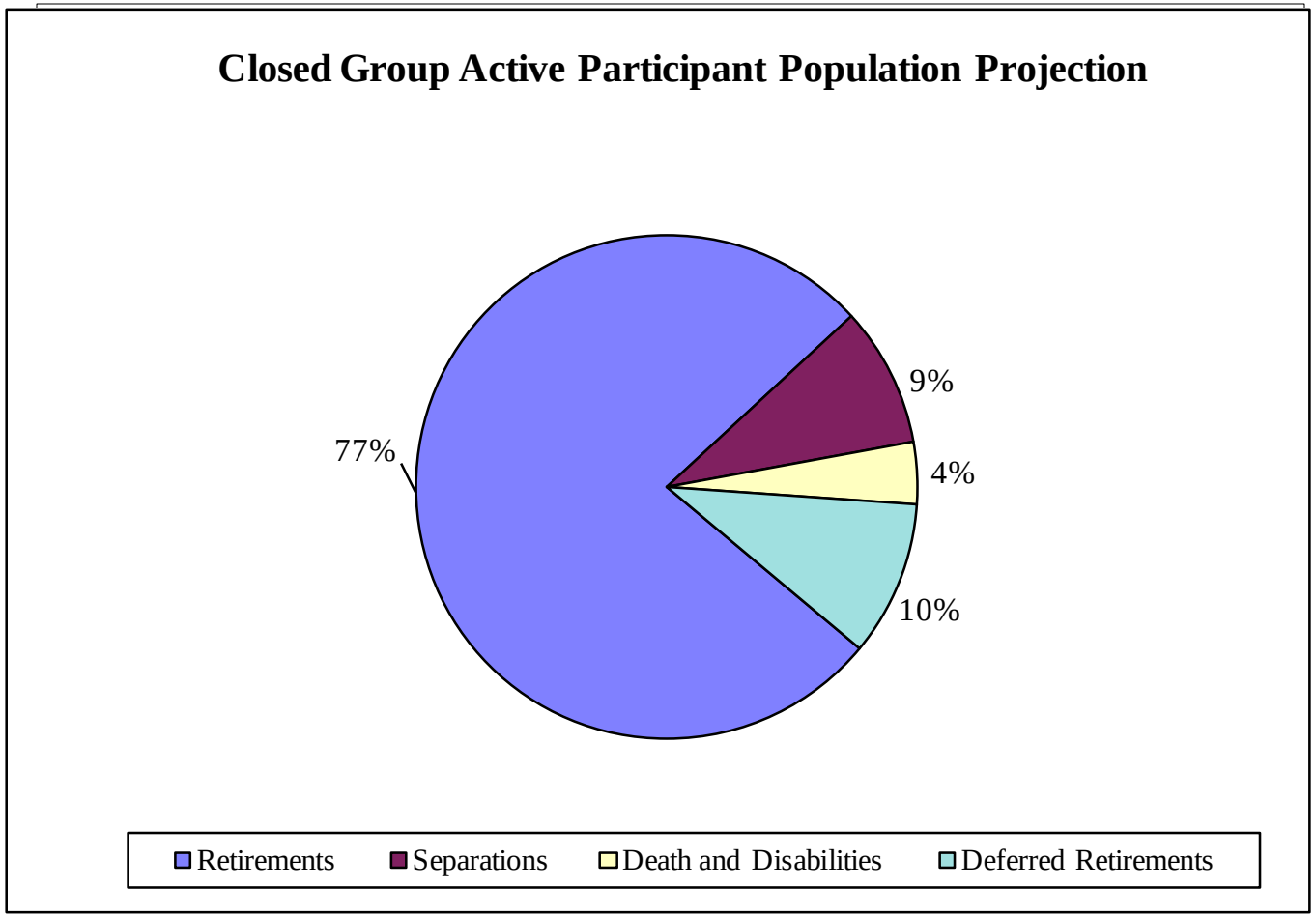
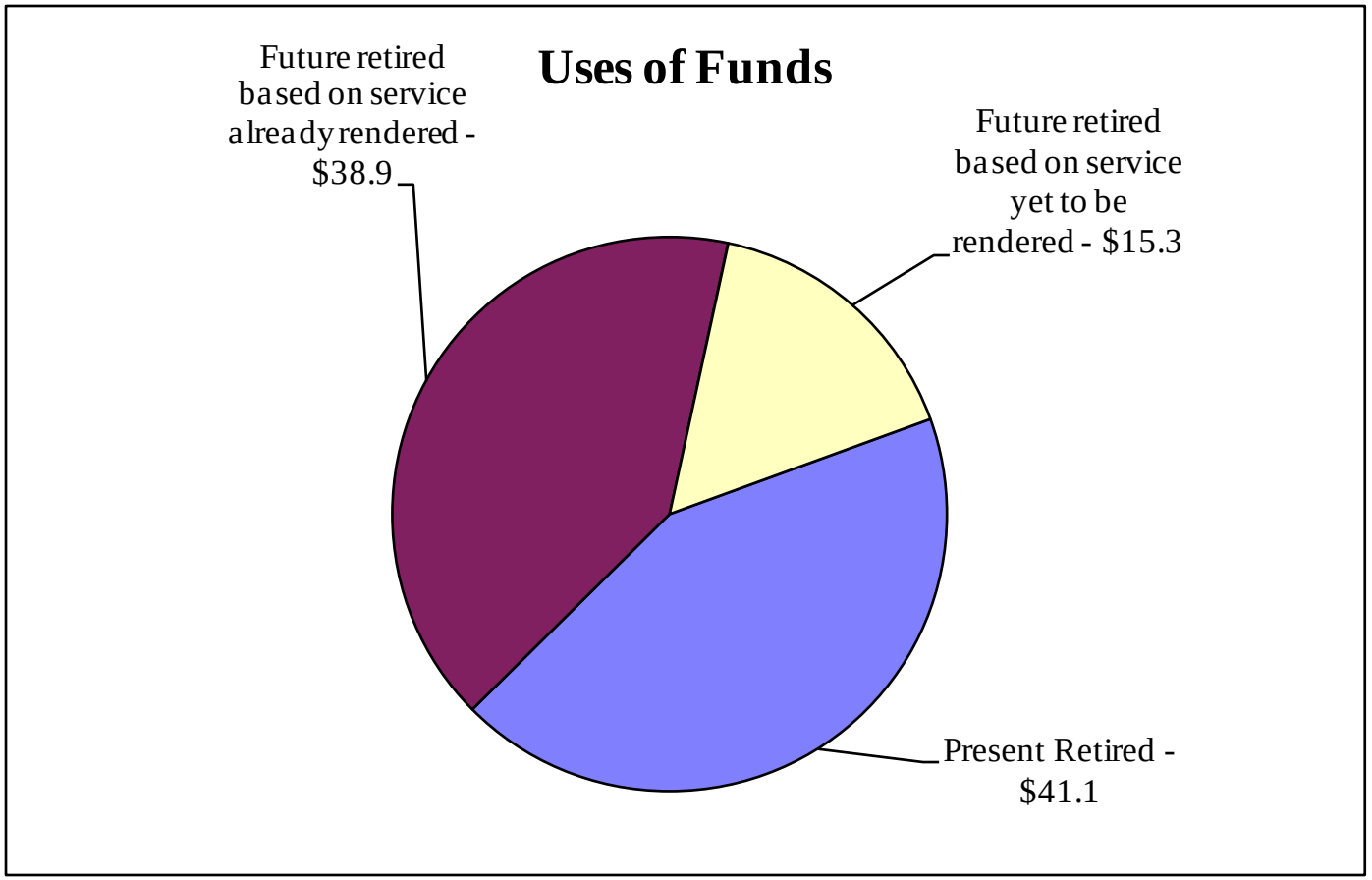
Expected Terminations from Active Employment for Current Active Participants

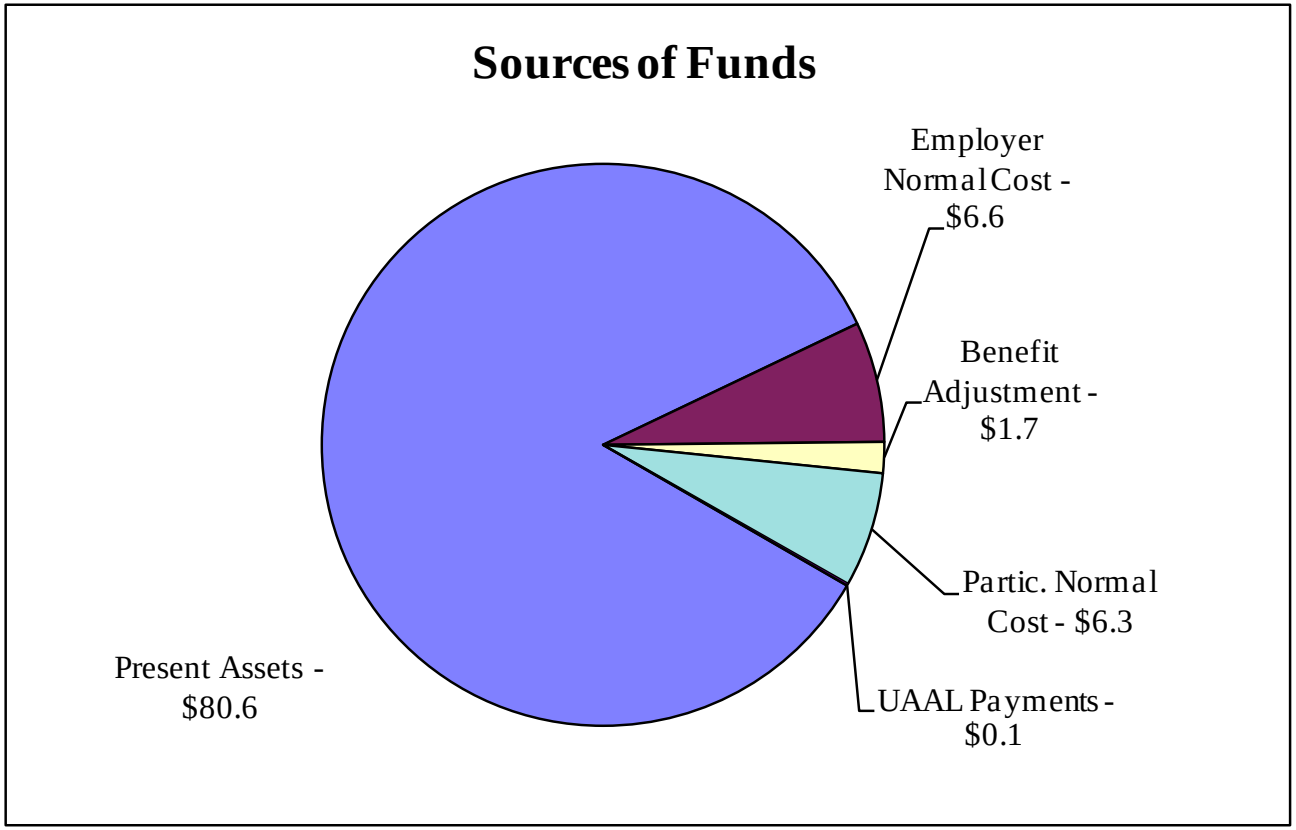


$95.3 Billion* of Benefit Promises to Present Active and Retired Members



* *Present value of future benefits; all divisions combined*

Sources of Funds for Financing $95.3 Billion* of Benefit Promises



* *Present value of future benefits; all divisions combined*

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Summary of December 31, 2010 Valuation Results

	General Participants		Executives & Elected Officials	
	2012	**2011**	**2012**	**2011**
Employer Normal Cost	5.2%	5.1%	9.8%	9.4%
Benefit Adjustment Contribution	1.6%	1.5%	0.0%	0.0%
Participant Normal Cost	5.0%	5.0%	4.3%	3.9%
Total Normal Cost	11.8%	11.6%	14.1%	13.3%
Unfunded Actuarial Accrued Liability (UAAL)	0.1%	0.1%	0.0%	0.0%
WRS Average Total	**11.9%**	**11.7%**	**14.1%**	**13.3%**

Summary of December 31, 2010 Valuation Results

	Protective Occupation			
	With Soc. Sec.		Without Soc. Sec.	
	2012	2011	2012	2011
Employer Normal Cost	9.0%	8.9%	12.3%	12.2%
Benefit Adjustment Contribution	0.0%	0.0%	0.0%	0.0%
Participant Normal Cost	5.9%	5.8%	4.9%	4.8%
Total Normal Cost	14.9%	14.7%	17.2%	17.0%
Unfunded Actuarial Accrued Liability (UAAL)	0.0%	0.0%	0.3%	0.3%
WRS Average Total	**14.9%**	**14.7%**	**17.5%**	**17.3%**

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Comparative Statement of Contribution Rates

Valuation 12/31	General	Exec. & Elected	Protective with Soc. Sec.	Protective without Soc. Sec.
1986	12.0 %	17.4 %	19.0 %	26.0 %
1991	12.4 %	17.6 %	17.3 %	23.9 %
1996	12.3 %	15.9 %	14.8 %	20.4 %
2001	10.6 %	11.7 %	11.7 %	13.7 %
2006	10.8 %	11.6 %	13.4 %	14.6 %
2007	10.6 %	11.5 %	13.2 %	14.1 %
2008	11.2 %	11.9 %	14.1 %	15.5 %
2009	11.7 %	13.3 %	14.7 %	17.3 %
2010	11.9 %	14.1 %	14.9 %	17.5 %

Concluding Comments

- Normal Cost contributions increased for all valuation groups due to continued phase-in of 2008 investment losses
- Change in Economic Assumptions was approximately cost neutral
- Upward pressure on contribution rates over next two years
- Results are based on benefit provisions in effect on December 31, 2010
- WRS continues to operate in accordance with principles of level percent of payroll financing